



US005819249A

**United States Patent** [19]  
**Dohanich et al.**

[11] **Patent Number:** **5,819,249**  
[45] **Date of Patent:** **\*Oct. 6, 1998**

[54] **TAX CODING EXPERT SYSTEM**

5,630,125 5/1997 Zellweger ..... 707/103  
5,673,369 9/1997 Kim ..... 395/75

[75] **Inventors:** **Laurel Anne Dohanich; Stephen Leo Dohanich**, both of North Potomac, Md.

*Primary Examiner*—Allen R. MacDonald  
*Assistant Examiner*—Jason W. Rhodes  
*Attorney, Agent, or Firm*—Whitham, Curtis & Whitham;  
Arthur J. Samdovitz

[73] **Assignee:** **International Business Machines Corporation**, Armonk, N.Y.

[\*] **Notice:** This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

## [57] ABSTRACT

An analysis protocol embodied in an expert system is articulated into portions to provide optimization of ease of use consistent with ease of design and updating of expert information contained therein. These portions include presentation of a fixed, invariant inquiry sequence and storage matrices which are accessed on the basis of responses to the inquiry sequence, a portion in which a decision tree is traversed efficiently under control of an inference engine based on user selections, preferably from a menu or a hierarchy of menus and a portion in which the analysis sequence is carried out by parsing text from an expert database into queries which are also preferably in the form of menus. Capture of the decision trees traversed together with corresponding user input data for at least selected analyses performed by the Expert system provides for capture of additional rules and business practices and facilitates correction of determinations, consistency of user intervention and expansion of the expert system.

[21] **Appl. No.:** **564,553**

[22] **Filed:** **Nov. 29, 1995**

[51] **Int. Cl.<sup>6</sup>** ..... **G06F 17/00**

[52] **U.S. Cl.** ..... **706/46; 706/50; 706/59; 706/60**

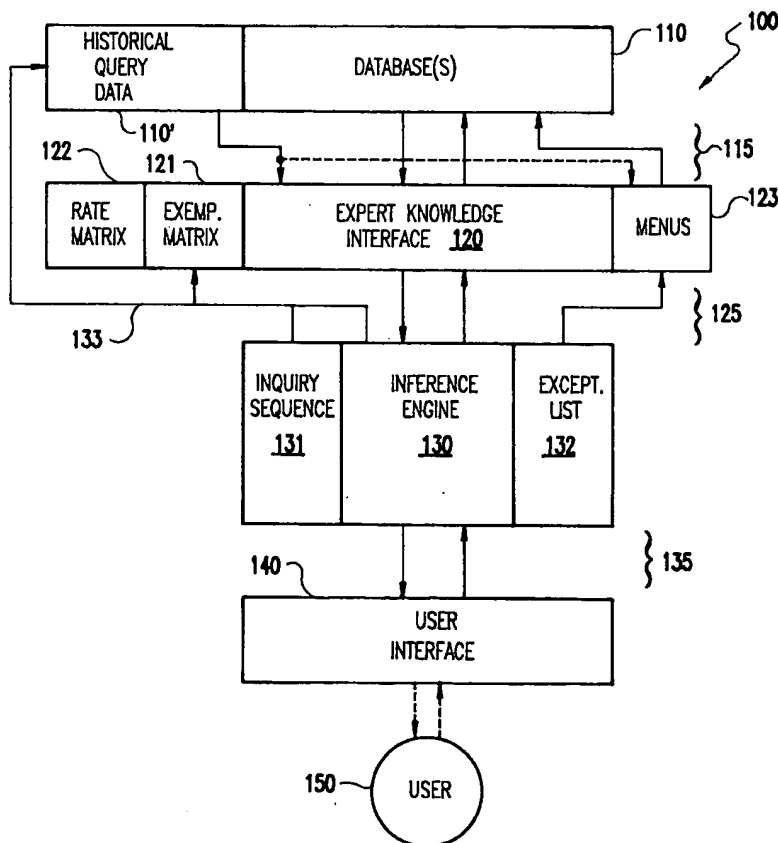
[58] **Field of Search** ..... **395/51, 54, 75; 706/46, 50, 59, 60, 45**

## [56] References Cited

### U.S. PATENT DOCUMENTS

5,006,998 4/1991 Yasunobu et al. .... 395/77  
5,574,828 11/1996 Hayward et al. .... 395/50  
5,619,991 4/1997 Sloane ..... 600/300

**6 Claims, 4 Drawing Sheets**



US-PAT-NO: 5819249

DOCUMENT-IDENTIFIER: US 5819249 A

TITLE: Tax coding expert system

----- KWIC -----

Detailed Description Text - DETX (2):

Referring now to the drawings, and more particularly to FIG. 1, there is shown, in high-level schematic form, a preferred architecture of an expert system implementing the invention. It should be appreciated that this high-level architecture is not specific to any particular application of an expert system. While the invention will be explained below in accordance with an application to an accounting system for tax coding, particularly as to **sales or use taxes**, such application should be regarded as exemplary of a particularly large and complex body of expert information which the present invention can accommodate but which could not, as a practical matter, be accommodated in prior expert systems. By the same token, the following description of application of the invention to tax coding should not be considered as being in any way limiting as to potential applicability of the invention.

Detailed Description Text - DETX (3):

In order to understand the complexity of a body of expert information to which the invention may be applied, it should be understood that, for example, **sales tax** and use tax laws in the United States are extremely complex and this complexity is increased by the variation of such laws among numerous jurisdictional levels (e.g. city, county, state, etc.) at which they may be applied. Applicability may also be affected by point of delivery or required shipping (e.g. interstate shipment or shipment to or from a foreign country) and the use to which goods are to be put. On the other hand, the existence of tax consequences attendant upon a purchase of goods and a determination of what the tax consequences may be (e.g. the applicable tax rate and the jurisdiction to which the tax must be paid) are often determinable on the basis of a relatively few pieces of information unless a conditional exception to the determination is applicable.

Detailed Description Text - DETX (4):

For example, many purchases are non-taxable but rules vary from jurisdiction to jurisdiction and are not always clear-cut; potentially requiring a complex analysis and decision process to determine tax consequences under applicable rules and statutes. Additionally, companies can apply for tax exemptions in states in which it plans to do business when the company purchases goods for resale or for use in production or research and development, although some states further limit such exemptions or do not issue exemptions at all. When such exemptions are granted, a company will have a different exemption clause for each state which grants an exemption and the exemption clause (e.g. NY-72282XX), of which there may be more than one for any particular state or jurisdiction must be attached to the purchase.

Detailed Description Text - DETX (8):

As alluded to above, the inference engine 130 includes an inquiry sequence 131 which embodies the analysis protocol of the expert system. In accordance with a significant feature of the present invention, particularly in the preferred exemplary application to tax coding, this sequence is preferably limited to an invariant, but, nevertheless, expandable series of questions which will be dispositive of an arbitrarily high percentage of analysis instances (e.g. an individual purchase, delivery or other transaction requiring analysis). In the case of tax coding for sales or use tax on purchases, input of the jurisdiction of delivery and the use of the goods or services purchased will be determinative of over ninety percent of instances. Such an arbitrarily high percentage could, of course, be diminished by changes in the tax code but it is anticipated that such an arbitrarily high percentage of queries which can be analyzed by a fixed series of questions generally could be restored by the inclusion of one or, at most, a very few other questions in the fixed sequence. The remainder are easily treated as exceptions, such as the mode of delivery and publication frequency cases mentioned above.

Detailed Description Text - DETX (23):

If the exemption matrix contains dispositive information, such as an indication that the purchase is tax-exempt, that circumstance will be detected at 216 and the appropriate response made, such as returning information that the purchase is non-taxable and the exemption clause. If the exemption matrix does not return a definitive response or contains an indication that further information is required (e.g. an exception flag), the analysis process continues at 220.